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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,189	07/29/2003	Daniel Yap	B-4335NP 620890-7	9232

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EXAMINER	
MALKOWSKI, KENNETH J	

ART UNIT	PAPER NUMBER
2613	

DATE MAILED: 08/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/630,189	YAP ET AL.	
	Examiner	Art Unit	
	Kenneth J. Malkowski	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9,12-18 and 20* is/are rejected.

7)☐ Claim(s) *10,11,13 and 19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/7/03, 7/15/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 13 recites the limitation "phase locked loop" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-2, 7-8, and 14-18 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 4,755,016 to DeLoach et al.

With respect to claims 1-2 and 14, DeLoach discloses an optical frequency modulated (column 1 lines 15-33 (invention is meant to produce high powered signals while retaining well defined phase or instantaneous frequency for coherent light-wave fiber-optic systems such as in a frequency modulated system as the frequency of the carrier contains the information)) transmitter comprising: (a) a plurality of slave lasers (Four high powered laser, Fig 2), each of the slave lasers having an output (Figure 2), the outputs of the plurality of slave lasers being combined to form a single output beam of the optical frequency modulated transmitter (outputs of lasers are shown being

combined into one signal, Fig 2)(column 1 lines 63-66 (optical paths combined))(column 4 lines 62-64 (means for combining higher power signals of the slave lasers to form an output signal of said transmitter)), the lasers of the plurality of lasers being separately phased-controlled (columns 1-2 lines 66-68 and 1-4 (optical path length can be adjusted on at least one of the separate optical paths)); and (b) a master optical oscillator which outputs an optical signal for injection locking said plurality of slave lasers (column 1 lines 49-66 (master oscillator, injection signal locks the phase of the light-wave output of the devices to that of the master oscillator)), the optical signal outputted by the master oscillator being frequency modulated (column 1 lines 16-21 (can be coherently modulated via frequency or phase shift keying)) directly in the master optical oscillator or externally thereof (master oscillator is shown externally modulated in Figures 1 and 2).

With respect to claim 7 and 18, DeLoach discloses the transmitter of claim 1 wherein a bias current or voltage is applied to each slave laser for adjusting the phase thereof relative to other slave lasers in said plurality of slave lasers (Figure 2, bias signals are sent from the box labeled feedback circuit to the phase adjusters)(column 3 lines 2-12 (feedback signal is an electrical signal used to adjust the phase of a path)).

With respect to claims 8 and 17, DeLoach discloses the transmitter of claim 1 further including a plurality of phase shifters, each phase shifter of said plurality of phase shifter being associated with and coupled upstream of one slave laser of said plurality of slave lasers (Figure 2, each phase shifter is the box with the ϕ symbol, and each phase shifter has an accompanying laser) for adjusting the phase thereof relative

to other slave lasers in said plurality of slave lasers (column 3 lines 12-25 (feedback signals ensure that the output of slave lasers have the correct phase outputs with respect to each other)).

With respect to claims 15-16, DeLoach discloses the method of claim 14 wherein the step of individually phase controlling the slave lasers in the plurality of slave lasers is performed in order to steer the optical beam to achieve wavefront coherence of the optical beam (DeLoach: columns 2-3 lines 62-67 and 1-25 wherein feedback error inherently "steers" the optical beam and wherein such steering is created to reduce individual outputs that are out of phase with each other, thereby achieving greater wavefront coherence)).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 3-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,755,016 to DeLoach et al. in view of "Multiple Oscillator Locking Via Optical Link," Proceedings of the European Microwave Conference, Paris, pp. 578-583 to Herczeld et al.

With respect to claim 3, DeLoach discloses the transmitter of claim 1, however, DeLoach discloses indirect modulation rather than direct modulation. Herczeld, from the

same field of endeavor discloses injecting multiple slave lasers with a high quality master oscillator via injection locking (page 579 paragraph 1) wherein the master oscillator is modulated in response to an application of a modulation current or voltage thereto to thereby modulate the outputted optical signal (page 580 paragraph 2 (one of two forms of modulation can be used in an injection locking method; direct modulation and indirect modulation)). Therefore, it would have been to one of ordinary skill in the art to implement the direct modulation as disclosed by Herczeld where an RF modulation signal is super imposed directly on the laser bias circuit as the type of modulation used on the master oscillator as disclosed by DeLoach. The motivation for doing so would have been that indirect modulation with an external modulator is lossy and limited in power handling capability (DeLoach page 590 paragraph 2). Furthermore, applicant discloses that using direct modulation or indirect modulation are functionally equivalent measures wherein choosing either form of modulation is a simple matter of design choice and that going from one embodiment to the other is an easy modification (page 13 paragraph 2).

With respect to claim 4, DeLoach in view of Herczeld disclose the transmitter of claim 3, at least one optical isolator disposed between said master oscillator and said plurality of slave lasers to prevent unwanted injection of laser light back into the master oscillator from the slave lasers (DeLoach 22, Figures 1 and 2)(DeLoach: column 2 lines 56-62).

With respect to claim 5, DeLoach in view of Herczeld disclose the transmitter of claim 4, wherein the master oscillator and the plurality of slave lasers are each optical

devices, which output light of a single carrier frequency [on page 4 lines 23-25 of applicants specification, applicant states that having multiple slave lasers injected by the same MO means that all of the said lasers are locked to a single carrier frequency]. DeLoach discloses this same scenario where all of the slave lasers are injected by the same master oscillator (Figure 2)(column 1 lines 59-62 (injection signal locks the phase of the light-wave output of the devices to that of the master oscillator)).

With respect to claim 6, DeLoach in view of Herczeld disclose the transmitter of claim 5, wherein the master oscillator and the plurality of slave lasers are provided by distributed feedback lasers (DeLoach: column 4 lines 34-37 (other single frequency lasers can be used, ie. a standard DFB semiconductor laser)).

7. Claims 11-13 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,755,016 to DeLoach et al. in view of "High-Performance Phase Locking of Wide Linewidth Semiconductor Lasers by Combined Use of Optical Injection Locking and Optical Phase-Lock Loop," Journal of Lightwave Technology, Vol. 17 No. 2 February 1999 to Bordonalli et al.

With respect to claims 11 and 20, DeLoach discloses the transmitter of claim 1 wherein the slave lasers are injection locked to the master oscillator, however DeLoach fails to specifically disclose they are each also arranged in a phase locked loop. Bordonalli, from the same field of endeavor discloses master/ slave laser control where the phase laser control uses a phase lock loop wherein the loop acquires the lock when the frequency offset between the maser laser and the slave laser is zero (page 328 column 2 paragraph 3). Therefore, it would have been obvious to one of ordinary skill in

the art at the time of invention to implement the phase locked loop laser technique as taught by Bordonalli into the slave laser within the system as taught by DeLoach. The motivation for doing so would have been to reduce errors of phase variance between the master oscillator and the slave laser (Bordonalli: page 341 column 2 paragraph 2).

With respect to claim 12, DeLoach in view of Bordonalli disclose the transmitter of claim 11 wherein the phase locked loop associated with each slave laser comprises a differential photodetector (Figure 1 (photodetector)) coupled to an input and an output of its associated slave laser (Figure 1 (slave laser)), the differential photodetector having an electrical output coupled to an electrical feedback path coupled to the associated slave laser (Figure 1 displays said feedback path entering an amplifier, a loop filter and said slave laser before being coupled back at the 3dB coupler)).

With respect to claim 13, DeLoach discloses the transmitter of claim 1 wherein the slave lasers are injection locked to the master oscillator, however DeLoach fails to specifically disclose they are each also arranged in a phase locked loop with a loop filter in the electrical feedback path. Bordonalli, from the same field of endeavor discloses master/ slave laser control where the phase laser control uses a phase lock loop wherein the loop acquires the lock when the frequency offset between the maser laser and the slave laser is zero (page 328 column 2 paragraph 3) the electrical feedback path in said phase lock loop also comprises a loop filter (Figure 1 (loop filter)). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to implement the phase locked loop laser technique as taught by Bordonalli into the slave laser within the system as taught by DeLoach. The motivation for doing so

would have been to reduce errors of phase variance between the master oscillator and the slave laser (Bordonalli: page 341 column 2 paragraph 2).

Allowable Subject Matter

8. Claims 10-11 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents are cited to further show the state of the art with respect to optoelectric transponder/transceiver systems in general:

U.S. Patent No. 4,649,351 is cited to show a master/slave injection locked transmission system

"Phase Locking of Lasers By An Injected Signal," Optics Letters, Vol. 7 No. 9, pp. 417-419, September 1982

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth J. Malkowski whose telephone number is (571) 272-5505. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KJM 8/1/06

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER